

WHAT IS CLAIMED IS:

1. A method of manufacturing a photo mask blank by forming an opaque film or a semi-transmission film on a transparent substrate, said method comprising a step of:

forming said opaque film or said semi-transmission film onto the substrate by irradiating the substrate with an ion generated by an ion generator separately disposed in a film formation chamber during the deposition of the opaque film or the semi-transmission film on the transparent substrate by a sputtering method.

2. The method claimed in claim 1, wherein said step comprises:
controlling a film stress of the opaque film formed on the substrate;
defining (a warp amount of the substrate after film formation) - (a warp amount of the substrate before the film formation) = (a warp amount of the substrate generated by the film formation); and

suppressing the warp amount of the substrate generated by the film formation to $\pm 0.1 \mu\text{m}$ or less.

3. The method claimed in claim 1, wherein said step comprises:
directly introducing an inert gas into the ion generator from the outside of the film formation chamber; and

ionizing said inert gas by the ion generator to irradiate the substrate with the ion.

4. The method claimed in claim 1, wherein said step comprises:
directly introducing a reactive gas into the ion generator from the outside of the film formation chamber; and

ionizing said reactive gas by the ion generator and irradiating the substrate with the ion.

5. A photo mask blank which is prepared by the method according to claim 1.

6. A photo mask which is prepared by using the photo mask blank according to claim 5.

7. A method of reducing a stress of a film formed on a substrate, comprising the steps of:

disposing an ion generator in a chamber together with the substrate;
and

irradiating, onto the substrate during depositing the film, an ion generated by an ion generator to relax the stress in the film.

8. The method claimed in claim 7, further comprising the steps of:
measuring a warp of the transparent substrate to define a warp amount;
calculating the stress on the basis of the warp amount; and
adjusting an irradiation condition with reference to the calculated stress so as to keep the stress into a predetermined range.

9. The method claimed in claim 8, wherein the predetermined range falls within $\pm 0.1 \mu\text{m}$.